

McGILL UNIVERSITY

PAPERS FROM THE DEPARTMENT OF BOTANY.

NO. 7.—A REVIEW OF CANADIAN BOTANY FROM 1800 TO 1895.

BY

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PAPERS FOR 1897

I.—A Review of Canadian Botany from 1800 to 1895.¹

PART II.

By D. P. PENHALLOW.

(Read June 21st, 1897.)

The history of botanical progress in the 18th century closed with the memorable work of the elder Michaux. It was therefore peculiarly fitting that the beginning of the 19th century should see his important contributions to the botany of this continent essentially continued by his son, François André, who made a distinct advance upon the work thus admirably laid down, in his *North American Sylva*, a work which, until the last few years, has stood unrivalled, and which has placed the author's name high in the list of eminent botanists.

Following close upon the labours of the elder Michaux there came one whose deep interest in the flora of this region had been aroused by essentially the same influences that led his predecessors, Kalm and Michaux, to undertake a labour which at that time was fraught with enormous difficulties, and which, while it seemed to greatly enrich the science they loved so well, and for which they endured so much, brought to them no gain beyond the reward which springs from the consciousness of a duty nobly conceived and as nobly discharged, and the enduring approbation of their fellowmen. I refer particularly to one whose work was one of the most important elements in the progress of botany in the early part of this century, not only in Canada, but also in the United States, and the close of whose life of toil and suffering among strangers was invested with a pathetic element which yet makes the place of his death and burial of more than ordinary interest to those who cultivate the science of plant life.

Frederick Pursh was born at Grossenhayn, Saxony, in 1774, and educated at Dresden.² In his account of the motives which led him to undertake his memorable work, he says :

" Among the numerous useful and interesting objects of natural history discovered in the vast extent of the new continent, none claim

¹ For assistance received in the preparation of this paper, I desire to record my obligations to Prof. John Macoun and Dr. J. G. Bourinot, of Ottawa; Mr. Harry Piers and Dr. A. H. MacKay, of Halifax; Mr. John M. Swain, of Prince Edward Island; Mr. G. U. Hay, of St. John, N.B.; l'Abbé Laflamme, of Quebec; Prof. W. J. Fowler, of Queen's College, Kingston; Mr. A. Alexander, of Hamilton, Ont.; Prof. L. W. Bailey, Fredericton, N.B.; Rev. Mose Harvey, St. John's, Newfoundland; Rev. F. W. Vroom, King's College, Windsor, N.S.; Dr. T. J. W. Burgess and Mr. H. Mott, of Montreal.

² Mr. James in the *Journal of a Botanical Excursion*, says he was born at Tobolsk, Siberia, but as he gives no authority for this statement, and as I have been unable to confirm it, I have adopted the data given by Pritzels as the more trustworthy. (Pritz. *Thes. Bot. Lit.*, 1872, 254.)

our attention in a higher degree than the vegetable productions of North America. Her forests produce an endless variety of useful and stately timber trees; her woods and hedges the most ornamental of flowering shrubs, so much admired in our pleasure grounds; and her fields and meadows a number of exceedingly handsome and singular flowers (many of them possessing valuable medicinal virtues) different from those of other countries. All these are more or less capable of being adapted to a European climate, and the greater part of easy cultivation and quick growth; which circumstances have given them, with much propriety, the first rank in ornamental gardening."

"A country so highly abundant in all the objects of my favourite pursuits, excited in me, at an early period of life, a strong desire to visit it, and to observe in their natural soil and climate, the plants which I then knew; and to make such discoveries as circumstances might throw in my way. This plan I carried into execution in the year 1799."¹

With the exception of his immediate predecessors, no botanist had accomplished more than Pursh to make the vegetation of Canada known, and since his time, very few have contributed in so important a degree to the enlargement of Canadian botanical science. Apart from his published *Flora*, the principal insight into his work in America is to be gained from his journal,² which was found among papers accompanying the herbarium of Dr. J. S. Barton when it was transferred to the custody of the American Philosophical Society of Philadelphia. This manuscript was later published by the society under the editorship of Mr. T. P. James, but unfortunately, it does not deal with that part of Pursh's work which was continued into and ended in Canada. Nevertheless, this record must always have a high degree of interest and value for Canadians as for other botanists, not only because of the valuable notes it contains, but because it gives a clear insight into the man's character and shows him to have been possessed of indomitable perseverance, pursuing his work amid all the harassing discouragements of very limited means which, on one occasion, necessitated the sale of his gun, and borne down by bad health which, on more than one occasion threatened to abruptly terminate his useful work. Amid difficulties which would have forced most men to turn their thoughts and energies in other directions, he preserved a hopeful confidence in his work, which proved the mainstay of all his labours. His entire explorations were made on foot.

Leaving the United States after about twelve years of hard and useful work, he visited the West Indies and thence proceeded to England where he completed the two volume work by which he is known. This done, he sailed for Canada where he spent the remaining years of his life in an effort to prepare a Canadian flora. He made extensive collections,

¹ *Flora Americae Septentrionalis*, I. v.

² *Journ. of Bot. Excursions*; Phila. 1807: *Flora Amer. Sept.*, 1814, I., viii.

chiefly through the province of Quebec, but all the material thus accumulated was subsequently destroyed by fire before it could be put into suitable form for publication, so that we have absolutely no record of his work here.

Pursh was not a voluminous writer. His energies appear rather to have been entirely exhausted in laborious field work to which he devoted so much of his time, in the preparation of his *North American Flora* and in contending with his physical infirmities. His only other publication was his *Hortus Olivienensis*, a small work of seventy-two pages published in 1815.

After a labour of only twenty-one years, Pursh died at Montreal on the 11th July, 1820, "so destitute of means that the expenses of his burial and other outlays were defrayed by his friends."

"He was interred in the old cemetery on Papineau Road." There his remains lay until 1857, when the facts becoming known to Dr. James Barnston and other members of the Botanical Society of Montreal, an effort was made to secure their transfer to a more fitting resting place in Mount Royal Cemetery. This was accomplished only in part, and for twenty years all that remained of Pursh, lay buried in one of the cemetery vaults,¹ a failure in the realisation of the original intention which was caused by the death of Dr. Barnston early in the spring of 1858, although some thirty-five dollars had already been subscribed toward the cost of a suitable monument.

In 1877 attention was once more drawn to the matter through the instrumentality of those who had been associated with the earlier attempt, and this time more strenuous efforts were made, not only to secure a suitable resting place, but to provide a monument as well.²

¹ In the *Daily Witness* of June 7th, 1877, an editorial directs attention to this great neglect, while an article in the same issue draws attention to the renewed efforts then being made, and gives in full, a sketch of the life of Pursh prepared twenty years previously by Dr. Barnston.

² An examination of some of the original documents connected with these efforts, kindly placed in my hands by Sir William Dawson, who was president of the Botanical Society at that time, shows that the original subscribers to the monument fund in 1857, included J. W. Dawson (afterwards Sir William Dawson), Dr. Sterry Hunt, George Shepherd, James Barnston, John G. Barnston, William Workman, Jr., and Rev. A. F. Kemp, all of whom contributed in equal amounts of one pound each. The committee entrusted with the responsibility of raising the necessary funds, consisted of Dr. Barnston and Mr. Shepherd. They issued the following circular, which may prove of interest, as showing the actual progress made up to the time of Dr. Barnston's death:

"Circular of the Botanical Society of Montreal, relative to a monument in memory of Frederic E. Pursh, the celebrated botanist.

"MONTREAL, Canada East, January, 1857.

"In the course of last spring the Botanical Society of Montreal became aware that Baron Pursh, the celebrated botanist, died in this city in 1820 and was interred in the old burying ground on Papineau Road. The society immediately felt its

Through the aid of the Natural History Society of Montreal, this was accomplished, the trustees of the Mount Royal Cemetery liberally contributing a lot in a retired and beautiful portion of the cemetery, where it may be seen by all who are interested in the work and sad ending of this most zealous scientist.¹ Pursh was the last of that interesting group of botanical explorers who, gaining a conception of our flora from the specimens transplanted to the gardens of the Old World, wished to extend their knowledge by a more intimate and practical examination of such a great wealth of vegetation on its own ground, and who thereby not only laid the foundations for the development of systematic botany on this continent, but placed all future botanists under obligations which they have been proud to acknowledge. To them our tributes of respect and grateful appreciation, constitute but a slight recognition of the great services they rendered.

One of the noteworthy local events of the period distinguished by the work of F. A. Michaux and Pursh, was the part taken by Dr. A. F. Holmes in advancing our knowledge of the flora of Montreal and its neighbourhood. Dr. Holmes was an enthusiastic botanist, an ardent collector, and a pioneer in the botanical work of this century. He began his studies of the flora of Montreal about 1820, and continued them, apparently, up to the date of his becoming a member of the Medical Faculty of McGill University—that is to say, 1820 is the earliest date appearing in his herbarium, while the latest date is 1825, the greater part of his work having been done in the years 1821 and 1822. Dr. Holmes became connected with McGill University in 1824, and in 1829 he became the first incumbent of the chair of botany in connection with the Faculty of Medicine. His herbarium was presented to the university in 1856, and constituted the nucleus of that now large and rapidly growing collection which has been developed during recent years. His plants

obligations to give tribute to so illustrious a name, and accordingly appointed a committee to transfer the remains to a new lot in Mount Royal Cemetery, purchased for that purpose, and to take steps to raise an adequate sum of money for the erection of a monument to his memory. The remains of Pursh now rest in Mount Royal Cemetery, and the committee take the liberty of soliciting the favour of your assistance in the efforts the society is now making to raise a suitable monument over his grave."

A recent visit to this monument, which is a plain granite obelisk rising from a square base, shows it to be in an excellent state of preservation. The inscription is as follows :

FREDERICK PURSH,
OBT. 1820, ÆT. 46.
ERECTED
BY MEMBERS OF THE
NATURAL HISTORY SOCIETY
OF MONTREAL,
1878.

¹ Can. Nat. N. Ser., ix., 187.

are in an excellent state of preservation, and well represent our local flora. According to a catalogue prepared by Dr. Barnston, who succeeded Dr. Papineau as professor of botany in McGill University in 1857, there are in all about 520 species of spermatophytes and pteridophytes. An inspection of this catalogue reveals many features of great historical interest, disclosing as it does, very striking changes not only in the flora of Montreal but in the growth of the city as well, together with the complete obliteration of localities which must have been remarkable for their vegetation.

Among those of whom there is but scant record, but whose unassuming work is deserving of notice, is the name of Titus Smith, of Halifax. From accessible accounts, it would seem that when a small boy, Smith displayed a taste for languages, and an intellectual capacity far beyond his years. The presentation of the works of Linnaeus to his father by Governor John Wentworth, seems to have been the probable source of his taste for botanical science, which, from all accounts of him, he appears to have cultivated to some purpose. Mr. Smith enjoyed a very high local reputation, and although he was engaged in much work of a scientific nature, his very retiring disposition seems to have prevented him from publishing in the scientific journals of the day. Such contributions from his pen as were published always appeared without any signature in local papers. In 1801 he was instructed by the governor of the province to make a tour of the forest lands of Nova Scotia, and to prepare a report on the soil, situation of the lands, the species, quality and size of the timber, and also to make remarks on such objects of natural history as he considered of sufficient importance. The journal of this survey is preserved among the archives of Nova Scotia, and forms a thick folio volume. It contains a vast amount of information, particularly relating to the botany of the districts examined. The manuscript journal of another part of Smith's tour of the province, is preserved in the form of a well filled note book among the books bequeathed to the Nova Scotia Historical Society by the late Dr. T. B. Akins, and so far as at present known, none of this material has ever been published.

For a period of about forty years, or until about 1842, Mr. Smith's time was chiefly spent in making surveys of various parts of the province, so that he came to acquire a remarkably accurate knowledge of the natural history of the country, and for this he was noted. That his botanical knowledge was scientific and accurate, would seem to be implied by the fact that among his correspondents he counted Dr. Graham, of Edinburgh, F. André Michaux, J. C. Leredon, and others who were authorities in their day. And yet it is a singular fact that his name has been completely forgotten. It does not appear in any of the usual lists, and nowhere have I met with it in the descriptive works bearing on the flora of this continent. Hooker makes no mention of him in his *Flora*

Boreali, and we are brought to the conclusion that he belongs to that large number of early botanists who did most excellent work, but of whom there was no special record, and the remembrance of whom has disappeared with the generation to which they belonged.

Murdoch says of Smith that he was "Remarkable for the vast and varied information he acquired in botany, natural history, etc. With a familiar knowledge of most that nature and books could teach an inquiring mind he united the unfeigned simplicity and kindness that rendered him an agreeable visitor as well in the families of our citizens as in the cottages of the most humble."¹

To these early years of the century belongs also the work of John Goldie. Our former knowledge of the work of this botanist has been recently enlarged by the publication of his diary for 1819² by his son James Goldie, of Guelph, Ontario, to whom I am indebted for a copy. Unfortunately this record, although of great interest and value, does not contain very many notes on the plants of the districts visited, but the preface contains interesting information respecting Mr. Goldie's work.

Mr. Goldie's earliest professional experience was in connection with the Botanic Gardens at Glasgow where, as a fellow-student he became acquainted with David Douglas, afterwards so well known in connection with the botany of the western portion of Canada. Later he was selected as the Government Botanist to the ill-fated Congo Expedition, but at the last moment was fortunately replaced through political influence. In 1817, at the instance of Mr. William Hooker (afterwards Sir Wm.), he sailed for America, where he spent two years in botanical explorations. During this time he made three separate shipments of plants to England, but none of these specimens were ever heard from again, and thus were the fruits of his labours destroyed. It was during this period that he discovered and described the fern (*Aspidium Goldianum*) which Hooker named after him, and the original description of which, together with an excellent figure, is appended to the diary.

Later Mr. Goldie collected for the St. Petersburg Gardens and was enabled to send many rare plants to England. During a second visit to Russia in 1830, he travelled extensively in Siberia. In 1844 he removed to Canada where he took up permanent residence, since which time he appears to have relinquished his interest in active botanical work.

From the time of the last published works of Pursh until 1830, in all about fifteen years, was a period distinguished by remarkable activity in Arctic exploration, beginning with the expedition of Barrow and ending with Parry. It was within this short period that the expeditions of Franklin, Ross and Richardson, of Beechy, Scoresby and Ross and Parry

¹ Hist. Nov. Scotia, III., 220.

² Dairy of a Journey through Upper Canada and some of the New England States, 1819; Toronto, Wm. Tyrrell & Co., 1897.

were accomplished, and to them we chiefly owe our early knowledge of Arctic vegetation. The large amount of material gathered by these expeditions stimulated great scientific activity, and for the first time the names of W. J. and J. D. Hooker, as also of Robert Brown, became permanently connected with the history of Canadian Botany. In 1824, David Douglas, whose name survives in our well known Douglas fir (*Pseudotsuga Douglasii*) undertook a journey to the Northwest, and later to other parts of British North American possessions, a work which was destined to leave a marked impress upon the botany of the country.

In 1829, Bachelot de la Pylaie issued a work detailing the results of his observations upon the flora of Newfoundland and the adjacent islands, and to him we owe the first record of the occurrence of *Calluna vulgaris* in America.

Within the same period there was a somewhat remarkable advance in botanical science in the United States, the result of which was an important influence upon the progress of the science in Canada. In 1817 Amos Eaton issued the first manual of botany for North America, and in 1818 Nuttall published his *Genera of North American Plants*, to be followed in 1842 by his important supplement to the work of the younger Michaux on the North American Sylva. The year 1820 witnessed the issue of that notable work on the flora of North America by W. P. Barton, and this was almost immediately followed by important contributions from Dr. John Torrey on questions relating to the flora of the Great Lakes and the upper waters of the Mississippi, while in 1825 Schweinitz produced a monograph on the North American species of the genus *Carex*, accompanied in the same year by an account of his expedition to the source of the St. Peter's River, Lake Winnipeg and Lake of the Woods.

Following the expedition of Parry in 1828, there was a period of comparative inactivity, during which but little real progress appears to have been made—a period which was also one of comparative inactivity among American botanists. During the twenty years from 1830 to 1850, not a single Canadian botanist of note appeared, and it is to foreign botanists that we are wholly indebted for such advances as were made during that time. It was within this period that Rafinesque issued his *New Flora and Botany of North America*, and that Torrey and Gray brought out the first part of their *Flora of North America*. In 1845 Tuckermann's first *Enumeration of North American Lichens* appeared, to be followed in rapid succession by other works of the same kind, while in 1847 Sullivant published his first *Contributions to the Bryology and Hepaticology of North America*. All of these contributions, while dealing with the various subjects from the standpoint of the American botanist, were destined to produce a profound impression on Canadian botany, and it yet remains true that we are even now dependent upon

these works and their successors—more particularly those dealing with the mosses and lichens—for our general knowledge of the plants with which they deal.

This period was, nevertheless, notable for two events of more than ordinary significance. In 1836, the results already reached by Arctic exploration were then enlarged by the observations and collections obtained during the expedition of Sir George Back to the mouth of the Great Fish River. In these results we observe for the first time a serious attempt to extend the botanical work beyond the mere collection of plants, and in his phænological observations, especially those relating to the temperature of trees, Sir George Back indicated some of the more important directions in which such scientific work should be prosecuted.

In 1840 the *Flora Boreali Americana* made its appearance. In this very important work Sir William Hooker presented a complete summary of all the results derived from the numerous Arctic and other explorations which had taken place during the preceding thirty years. It was, therefore, at that time, a complete summary of our knowledge of the Canadian flora, and it represents for that time what has been accomplished more recently in a more extended, though different way, by Macoun's Catalogue. It is, in fact, one of the most important of the few landmarks which indicate the various steps in the progress of Canadian botany.

With the exception of Hooker and Back, this period is notable for the absence of local work and our almost complete dependence upon that of American investigators; and we thus find the names of Rafinesque, Gray, Torrey, Tuckermann and Sullivant standing forth with great prominence as exerting a dominant influence. The *New Flora of North America*, which Rafinesque issued in 1836, was intended to be an enlargement upon the work of his predecessors—that it should, in fact, supplant and be additional to all the botanical works hitherto published in North America and the United States.

Torrey had already contributed in important ways to a knowledge of our flora, but in the *Genera of North American Plants*, his studies of the Cyperaceæ and more particularly in his *Flora* which was issued as a joint work with Dr. Gray, he added very materially to our knowledge. Gray, who was later to exert an important influence upon Canadian botany through his numerous publications, was, during this period, brought into close sympathy with scientific progress in Canada not only through his joint work with Torrey, but through his later publication of the *Genera of North American Plants*.

To Tuckermann we are indebted for the first and most complete study of the North American Lichens, a work which extended from 1845 when his first enumeration appeared, until 1882, the date of the publication of his last efforts. Although Tuckermann's descriptions are usually so

involved in difficult phraseology as to make his meaning obscure to most students, his work was executed with the greatest care and fidelity, and it must necessarily stand as the basis of all future work in this direction.

Yet another new field of study was entered upon during this period by Sullivant who accomplished for Canadian botany in those earlier days what was later done by Lesquereux and James, and within recent years is being done by Kindberg. His accurate and painstaking work in Bryology, stands as a model of what such work should be, and must always secure to him an eminent place among Canadian botanists, as it has among those of the United States. The very valuable collections upon which these studies were based, now form an essential part of the Herbarium of Harvard University.

As already pointed out, the various botanical collections derived from the Arctic expeditions of Ross, Parry, Franklin and others, were chiefly described by Sir William Hooker. The material which thus gradually accumulated during a period of some twenty-five years, was at length to form the basis of the most important contribution to Canadian botany which had yet appeared. In 1840 Sir Wm. Hooker issued his well known *Flora Boreali* or the botany of the northern parts of British America. As we are informed by the little page, dedication and preface, this very noteworthy production was based upon the collections made during the expeditions of Sir John Franklin, by Dr. Richardson and Mr. Drummond under "circumstances of singular difficulty, hardship and danger. Unavoidable circumstances delayed the publication much beyond the intended time, an event, however, which was not without its advantages, since the accumulation of new material, particularly from the collections of Mr. Douglas, Mr. Tolmie and Dr. Gardner, permitted the description of many additional species, although the dimensions which the work thus attained finally necessitated leaving out of consideration the whole of the Cryptogams except the ferns and their allies, and in the exclusion of descriptions of plants already well known."

The title given to this work is in some sense misleading, since as explained by Sir Wm. Hooker himself, it was intended to include the work of all British naturalists "from the days of Newnham¹ and Menzies, to those of Beechy and the officers attached to the Hudson's Bay Company's Factories"; it therefore presents "the vegetation of all that portion of North America proper, which, commencing with the extreme Arctic islands, stretches south to the boundary, so far as it has been ascertained, of the United States and California."²

In his *Flora Boreali*, Sir William Hooker states that "the more densely inhabited parts of Canada have produced many native botanists,"³ and

¹ Rev. Can. Bot., Trans. R. Soc. Can., V. iv. 43.

² Flor. Bor. Amer. I. Pref. iv.; Hook., Bot. Misc. I. 92.

³ Flor. Bor. Amer. I. Pref. iv.

in another place¹ he apparently refers more specifically to them when he speaks of "botanical productions of Canada which have been received from the Lady Dalhousie, Mrs. Percival, Mr. Sheppard and Mr. Todd, etc.," and also refers to "plants of Newfoundland and Labrador, gathered by Dr. Morrison, who afterwards fell a victim to his courage and love of science in exploring Central Africa." To this list may also be added the name of Titus Smith, already referred to, and that of Garry, an officer in the employ of the Hudson's Bay Company, one whose name survives in Fort Garry, now Winnipeg, as also in *Quercus Garryana*, of Douglas. A careful search of the usual records fails to disclose any information concerning any of these botanists, who were evidently well known to Sir William Hooker. It seems probable, therefore, that owing to their work being wholly confined to collecting, and in the absence of published writings, their names have gradually fallen into neglect, and the part they played in the advancement of Canadian botany—important if obscure—cannot now be ascertained, and it is more than probable that there were many others, of whom all trace has been completely lost.

The year 1850 is noteworthy as marking the commencement of a period of exceptional activity in botanical research throughout the civilised world, and in this Canada participated, though not to the same extent as other parts of this continent. Nevertheless, our progress since that time has been due to native botanists in a far greater degree than formerly. It was at the commencement of this period that Dr. Barnston became known as a botanist of enterprise and ability, and one who would, had he lived, have taken an important part in the questions of the day.

It is to this period also that the late Abbé Brunet belongs. This scientist was well known to the leading botanists of his day, and to him we owe the foundation of the first botanical museum in the country. For many years the herbarium at Laval University took precedence over all others. The Abbé Brunet was also well known through several scientific papers, and his death in 1876 involved a distinct loss to the science he represented.

To the Abbé Provancher we are indebted for the first distinctively Canadian work on the vegetation of this portion of the continent, and his *Flore Canadienne* has continued to serve as an important guide to a knowledge of the flora of Quebec. In *Le Naturaliste Canadien*, l'Abbé Provancher also continued to work for the advancement of Canadian botany. During the later years of his life he was local secretary of the Botanical Club of Canada. By his death, in 1892, Canadian science suffered a severe loss, more particularly as he was one of the very few French naturalists among us.

¹ Hook. Bot. Misc., I. 92.

Few men resident in Canada have exerted a more marked influence upon the history of botanical progress in this country than the late Dr. George Lawson, of Halifax. His writings were numerous and valuable, and with one notable exception, were more numerous than those of any other Canadian botanist. He occupied important educational positions, first at Kingston, Ontario, and later at Halifax, Nova Scotia. It was through his instrumentality that the Botanical Society of Kingston was organized, and it was also due to his suggestion and energy that a serious attempt was made to establish a botanic garden at the same place.

Although it has not formed a part of my plan to refer particularly to the works of those who are yet among us, I cannot refrain from making an exception in one case, by reason of the very prominent position his work occupies in our recent progress. Until about 1850, no botanical work involving special research in some of the more difficult problems of the science had been undertaken here. All that had been accomplished was in the study of floras and the classification of plants in accordance with the then prevalent methods. About this time Dr. Dawson (afterwards Sir Wm.) had his attention drawn to the study of fossil plants, which he then took up with great enthusiasm, approaching the question from the standpoint of the more minute anatomy of the internal parts. This was the first attempt of the kind, not only in Canada, but also, probably, on this continent. The introduction of vegetable paleontology into the field of Canadian research marked a distinct era in the history of botanical progress here. Although Sir William's contributions chiefly relate to fossil plants, they include other papers of great importance, and they have now reached the astonishing total of 76,¹ a number just twice as great as that of the next most voluminous writer.*

We are all sensible of the important position which these contributions occupy in our literature, and I trust Sir William will not consider it out of place if I state that no other Canadian has ever exerted so profound an influence upon the history of Canadian botany, especially in its higher aspects.

Arctic expeditions have continued to contribute their share through the collections derived chiefly from those of Kane, Nares and Greely. Foreign botanists have also continued to exercise an important influence, more especially those of the United States, who have been so peculiarly situated as to make direct explorations to the north, or who, from their more special training and ability in the study of particular groups, have naturally been referred to as specialists. About the only English botanist

¹ This includes only those papers which are strictly botanical. The total given is probably much below the actual figure, since I am satisfied that it has been impossible to gain knowledge of the great number of widely distributed papers he has written.

* Dr. George Lawson.

whose name stands forth prominently in this later period is Sir J. D. Hooker, the worthy successor of Sir William Hooker. To him we are indebted for an extension of our knowledge of Arctic vegetation, his studies being based upon material collected during the expeditions of Richardson, Belcher and McClure, of McClintock and Nares, which latter, with the exception of the Greely expedition, was the last to add anything to our previous knowledge of the vegetation of these high latitudes.

Until 1850 no attempt had been made to enter upon a critical study of our marine vegetation. In 1852, however, under the auspices of the Smithsonian Institute at Washington, Harvey commenced to issue a series of studies of the Marine Algæ of North America, a work which was not completed until 1858. Although dealing largely with more southern forms, this work includes a number of species common to the Atlantic Coast of Canada, and it is therefore entitled to a place here. A more direct contribution to the marine flora of our coasts was made by the same author in 1862, being an account of Algæ collected by David Lyall at Vancouver's Island in 1859-61. Minor contributions to Canadian botany were made by Lyall in 1863, W. L. Lindsay in 1865, and by M. J. Berkely in 1875.

Among the American botanists who gained prominence in this period we first encounter the name of Boott, who, as an authority on the Carices, described those plants collected during the expedition of Sir John Richardson. Later, the well-known names of Eaton (D. C.) and Farlow appeared, and within very recent date we find the names of Ellis and Everhart as authorities upon a very extensive and difficult group of fungi. Canadian botany will always rest under the greatest obligations to Prof. C. S. Sargent for the highly important work he has accomplished in advancing our knowledge of that great forest-wealth which is so rapidly disappearing. In his contributions to the 10th Census of the United States on the Forestry of North America, he gave at once the most concise and authoritative work on the distribution of forest trees on this continent ever issued, and as a contribution to scientific and economic botany it must ever hold an important place. The superb *Sylva*, a voluminous work of twelve large volumes, now in course of publication, stands without a peer. It is a worthy compendium of the laborious and accurate work of botanists from the days of Michaux, Pursh and Nuttall to the present time. While it is perhaps a source of mortification to feel that the conditions of scientific progress here are such as to render works of this character practically impossible in Canada, it is also a source of great gratification to feel that the rich endowment of science which is so prominent a feature in the advancement of our neighbours to the south of the line, as also the cultivation of that generous spirit of brotherhood in science, a spirit which recognises no artificial limitations, permits us to share its advantages as if it were our own.

Botanic Gardens,

HALIFAX.

The earliest attempt to establish a botanic garden in Canada, of which there is any record, was made at Halifax, Nova Scotia. At the settlement of Halifax by Cornwallis in 1749, the whole rear portion of the town was set apart as common, to be devoted either to military purposes or the use of the town. In front, on what is known as Citadel Hill, the fortifications were built, while in the rear were marshes, used at that time as shooting ground. Gradually much of this land was reclaimed and converted into fields. About fifty or sixty years ago a number of men interested in the cultivation of fruits and flowers, obtained from the city a concession of several acres of this common which they fenced in, and for many years raised fruit, flowers and vegetables which were sold. An admission to the grounds was also charged. As the holders of this concession gradually passed away, the property became neglected and debts accumulated. Finally, about twenty-five years ago, two zealous floriculturists who were at that time members of the city council—John McCulloch and William Barron—proposed that the council should buy out the interests of the Horticultural Society, the members of which either surrendered their interests or sold them at a nominal rate. The city thus secured the entire property for a few thousand dollars, and at once added a large tract of the adjacent marsh land. This change was rendered possible largely through the generosity and influential representations of Michael Dwyer, Esq., a leading banker and commercial man of Halifax, and a member of the Horticultural Society, in whose hands the property had for so long remained. The garden comprises fifteen and one-half acres, and is diversified with ponds, water courses, arbors and shrubbery, and while no attempts are made to conduct scientific work, the general treatment is designed to promote a knowledge of trees and shrubs, and to some extent also of flowering herbaceous plants. Under the skilful management of the superintendent, Mr. Richard Power, the garden enjoys a wide reputation for beauty.

KINGSTON.

Among the objects specified in the constitution of the Botanical Society of Canada, we find it stated that "the Society shall seek to promote its objects by * * * experiments on the indigenous and domestic plants of Canada; the introduction and distribution of new plants and seeds adapted to the wants of the country; the encouragement of arboriculture, forest conservation, and the culture of fibre, dye, oil, food and medicinal plants, together with the publication of papers embodying the

results arrived at, and the information brought together by the above means. The ultimate establishment of a botanical and experimental garden shall be held in view as an important means of carrying out the Society's objects."¹

This was the second attempt in Canada to found a botanic garden, a movement which had its origin at the hands of him who also founded the Botanical Society. Like the latter, it was short lived, and for the same reasons ceased to have existence at a time when active work had but fairly begun.

MONTREAL.²

Dating from the year 1850 various suggestions for and attempts to form a botanic garden in Montreal have been made, but it was not until 1885 that these efforts took practical shape, when, under legislative enactment an association was formed under the name of the Montreal Botanic Garden Association, the officers of which were Rev. R. W. Norman, chairman of the board of management; Prof. D. P. Penhallow, director, and H. S. Evans, secretary; these together with Dr. T. Sterry Hunt, Hon. Louis Beaubien and Alderman R. Holland, forming the board of management.³

The work of organization was actively prosecuted and plans for the necessary conservatories were secured. A very large amount of preliminary work was accomplished, and one report was issued.⁴ Private citizens were prepared to contribute largely to the maintenance and endowment of the gardens, but the ultimate failure of the city to grant the necessary land already promised, brought the work to an abrupt termination at the close of the second year's operations.

MCGILL UNIVERSITY.

In 1890 a second attempt was made to establish a garden in Montreal. At that time McGill University, feeling that a garden was urgently needed in order to provide opportunities for practical study, secured by lease, a beautifully situated lot of nine acres at Côte des Neiges. To the plant-houses already situated there, the University added another for the special accommodation of the Australasian collection, which now forms a notable feature of the garden resources. The conservatories embrace a total ground area of 4,600 square feet, and com-

¹ Ann. Bot. Soc. Can. 1861, 9, 14.

² For an interesting historical account of the Gardens of Montreal, reference may be made to The Canadian Horticultural Magazine, vol. I, published by the Montreal Horticultural Society.

³ 10th Ann. Rept. Mont. Hist. Soc. 1884, 21.

⁴ 1st Ann. Rept. Mont. Botanical Garden Ass'n. 1890.

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prise three temperate houses and one mixed stove house. The collection includes a large representation of type groups suited to purposes of instruction, and an especially valuable collection of Australasian plants chiefly derived from donations by the late Baron Von Mueller of Melbourne.

The garden proper contains a large representation of plants, and affords invaluable resources in conjunction with the conservatories, for the prosecution of practical studies. About 275 students annually receive the benefits of the advantages thus offered. The gardens are open to the public daily without charge, and students are supplied with special tickets which secure to them the use of such material as they may require for independent study.

OTTAWA.

When the Central Experimental Farm at Ottawa was established in 1887, the plans contemplated the formation of an arboretum and botanic garden, with the object of bringing together all the native species of plants, and also of testing the hardiness and adaptability to the climate of Ottawa, of shrubs and trees growing in northern climates in other parts of the world.

The actual work of the garden was begun in 1889, when 210 species were planted. The direct management, at first in the hands of the entomologist and botanist, Dr. Fletcher, was later transferred to Mr. W. T. Macoun. In 1894 the arboretum and garden included 1,000 trees and nearly 200 species and varieties of herbaceous plants, while the close of the year 1895 saw these numbers raised to 1,800 and 1,000 respectively.

Supplementary gardens are also established at each of the experimental farms for the several provinces, which serve an important purpose in solving questions of a local character and as local centres of distribution.

Botanical Societies.

MONTREAL.

So far as can be learned, only three attempts to found botanical societies in Canada have been made. The first two founded were very short lived, while the third and most recently organized, is altogether too young to admit of any reasonable forecast as to its future career and usefulness.

The first of these societies was founded on the 28th of March, 1855, and was known as the Botanical Society of Montreal, an organization which largely owed its existence to the enthusiasm and energy of Dr.

James Barnston, whose untimely death early in the spring of 1858 brought its short but active career to an abrupt termination.¹

One of the very few mementoes of the society is to be found in an occasional copy of the "Objects and Constitution of the Botanical Society of Montreal," issued in small pamphlet form. From this we learn that although the society was instituted in 1855, it was nearly a year later before a constitution was adopted. Under it, Principal (now Sir William) Dawson was the first and probably the only president, the other offices being filled by Dr. T. Sterry Hunt, John G. Barnston, Dr. James Barnston, Rev. A. F. Kemp, David A. Poe, George Shepherd and — Bergholts. The society left little record of its work. Two papers read before it by George Barnston and Rev. A. F. Kemp appear to summarise the full extent of its work in this direction.² As indicated by the constitution, however, one object of the society was the building up of "a complete herbarium of the native plants of Canada, and the collection of the various vegetable products of the country." This object appears to have been realized only with respect to the first part, and the few hundred plants thus brought together were deposited in the museum of the Natural History Society of Montreal, where they may now be found.

KINGSTON.

"Towards the latter end of November, 1860, a proposal was made to organize a botanical society. There being no such institution in operation in Canada, it was thought that much benefit might result from its establishment." Such are the terms in which a description of the origin of the second botanical society to be founded in Canada, finds its introduction. The Botanical Society of Canada, having its headquarters at Queen's College, Kingston, owed its origin to the energy and ability of the late Dr. George Lawson, who was at that time professor of botany at Queen's, and who was destined at a later date to found the Botanical Club of Canada. In consequence of wholly unforeseen circumstances which involved the removal of Dr. Lawson to Halifax, the society came to an abrupt termination within one year. Nevertheless, in the very short period of its existence, it displayed great vigour and gave promise of a most useful career. It published one volume of *Annals* of 108 pages, from the contents of which we observe that the society was not only able to collect much valuable material, but that it had enlisted the sympathy and active co-operation of a large number of the leading botanists of Europe and America.

¹ Can. Nat. III. 224. Can. Nat., New Ser., IX. 187.

² Can. Nat. II. 12, 145.

BOTANICAL CLUB.

At the meeting of the Royal Society of Canada, held at Montreal in 1891, Dr. George Lawson, of Halifax, introduced to the fourth section a question relative to the expediency of establishing a botanical society for the whole Dominion. Upon the report of a special committee, the section adopted a resolution favouring the organization of such an association to be affiliated with the Royal Society on the same terms as other societies. It was thus that the Botanical Club of Canada came into existence, with Dr. Lawson as its first president and Dr. A. H. MacKay, of Halifax, as its secretary. The scheme of organization contemplated the appointment of a secretary for each province, by whom the work would be distributed through the medium of local secretaries in such districts as would warrant their appointment.

The annual report for 1895 shows that in the three years of its existence, the club has accomplished a large amount of good work, and that its usefulness is growing year by year. The membership at the present time numbers 201, and is steadily increasing. The work of the club is largely directed toward stimulating an interest in the study of botany among the pupils of the various schools throughout the country, and to this end both encouragement and assistance are given in the study of various local floras, and in the formation of herbaria. Plants requiring determination are sent to the secretary of each province, or to Prof. Macoun at Ottawa, who has kindly undertaken to do a large share of this work. Apart from this purely educational work, the club has also undertaken a series of phenological observations, which will continue for a long series of years, and which in course of time must prove of great scientific value.

Scientific Societies.

In addition to those societies which are designed primarily or wholly for the cultivation of botanical science, we find a number of others which include botany among the various subjects with which they deal. The most important of these are the New Brunswick Natural History Society; The Ottawa Field Naturalists' Club; The Hamilton Association for the Promotion of Science, Literature and Art; The Nova Scotia Institute of Science; The Canadian Institute; The Natural History Society of British Columbia. All of these societies have exerted an important influence in the development of Canadian botany, and their publications contain many valuable contributions to this subject, notably those of the Ottawa Field Naturalists' Club; The Natural History Society of Montreal; and the New Brunswick Natural History

Society, and we may therefore look to these publications as authentic sources of the history of botanical progress for the several provinces.

Botanical Collections.

One of the best indications of the position attained by botanical science in any country is to be found in the extent and character of the collections, more especially of the herbaria, since these at once represent the extent to which the science has been made a living one. Although it is impossible to make any correct comparison as to the relative importance of an efficient working library and extensive collections, since each is of the very first importance, and both are absolutely essential in the life of any institution where biological science is made a living force, it is undoubtedly safe to say that in its relation to the public at large, a thoroughly equipped botanical museum in which plants and plant products in their multitudinous forms, as applied to the various wants of man, whether in art, science or industrial processes, are displayed in their proper relations, is an educational factor of the greatest value, offering as it must opportunities for the extension of knowledge along the lines of least resistance. It is an appreciation of this fact which has led to the gradual upbuilding of all the great botanical collections of the world, and in any comprehensive survey of botanical progress they must be taken into consideration.

GEOLOGICAL SURVEY.

The most extensive herbarium in Canada is that of the Geological Survey at Ottawa. This collection had its origin in 1860, when Prof. Macoun commenced systematic collections in various parts of Ontario, and opened exchanges with several of the leading systematic botanists of the United States. At the time of the Centennial Exposition at Philadelphia in 1876, these collections had grown to such dimensions that a large and representative herbarium of specimens from various parts of Canada was exhibited, and afterwards deposited in the herbarium of McGill College. A second collection was exhibited at Paris in 1878, and later deposited in the herbarium at Kew. By 1882 the collections of Canadian plants had become so extensive that the Government was led to purchase it for use in connection with the work of the Geological Survey, and its former owner was appointed as curator.

Since then the herbarium has experienced a rapid growth both by the collection of native species and the acquisition of foreign species through the medium of exchange. It embraces practically all known Canadian species, as well as a very large representation from the United States. Natal, East Africa and Australia are represented by valuable

collections. Through the kind assistance of Dr. Warming of Copenhagen, Prof. Blytt of Christiania, and Dr. Kindberg of Linköping, a very nearly complete series representing the flora of Northern Europe has been obtained.

One of the most important features of the herbarium is a series of plants collected by the earlier explorers, and representative of nearly all the plants described in Hooker's *Flora Boreali Americana*. This very important addition was made through the courtesy of the Director of the British Museum of Natural History. The herbarium, as now constituted, embraces 70,000 sheets.

MCGILL UNIVERSITY.

The foundation of the McGill College Herbarium was laid in the gift of the collections of Dr. A. F. Holmes, the first professor of botany in the Medical Faculty. Subsequently, under the direction of Sir William Dawson, a number of additions were made, chiefly as derived from students' collections. In 1876 Prof. Macoun deposited his centennial collection with the College, and it has lately been incorporated with the University herbarium, to which it was donated by the Geological Survey. In 1883 the material thus brought together was properly mounted and systematically arranged, and since that date extensive additions have been made both by gift and by purchase. These additions are representative of Australasia, India, Japan, South Africa, South America, and Northern Europe. The collection now embraces about 30,000 specimens.

The economic collection includes an important group of plant products chiefly from India, comprising dyes, foods and textiles, and specimens illustrating nearly all the Canadian timber trees, as well as many of those of the United States.

In addition there is a special collection embracing all known species of North American trees and shrubs, prepared for special research work, and represented by (a) hand specimens, (b) microscopical preparations and (c) sections prepared for the microscope, but kept in bulk. These preparations constitute the type material employed by Prof. Penhallow in the prosecution of special researches connected with a classification of woody plants.

LAVAL UNIVERSITY.

The herbarium of Laval University at Quebec is the oldest in Canada, having been formed by the late Abbé Brunet in 1860, during his occupation of the chair of botany. "The Canadian plants which the herbarium now contains were gathered for the most part by himself, and are the

fruit of twelve years of earnest work."¹ The plan of Abbé Brunet included the formation of a general botanical museum, which now comprises²:

"1° Une collection de bois canadiens employés dans l'industrie et ayant une valeur commerciale.

"2° Plusieurs collections de bois préparées spécialement pour l'étude. La principale est celle de nos végétaux ligneux indigènes, qui est une des plus complètes de l'université.

"3° Plusieurs collections de bois exotiques: entre autres, une collection très remarquable des bois de commerce qui se vendent sur les marchés d'Angleterre.

"4° Une collection de fruits artificiels d'une rare beauté, auxquels on peut rapporter les nombreuses variétés de pommes, poires, prunes, pêches, etc.

"5° Une collection de champignons artificiels, comprenant les champignons comestibles, les champignons suspects et les champignons vénéneux.

"La dernière salle contient l'herbier, ou plutôt la collection des herbiers de provenances diverses, tous authentiques, qui composent 1° l'herbier Américain (plantes du Canada et des Etats-Unis); 2° l'herbier général. L'herbier Américain se compose des collections de C. C. Parry, E. Hall et J. B. Harbour, de Chs. S. Geyer, de N. Riedl, de Leidenberg, de M. Vincent, plus un grand nombre d'échantillons fournis par Moser, Smith et Durand. Plusieurs plantes sont étiquetées de la main même de Nuttall et de Rafinesque.

"Les plantes du Canada ont été recueillies en grande partie par l'abbé O. Brunet. Les individus douteux ont été comparés à ceux de l'herbier de Michaux à Paris, et de Sir W. Hooker, à Kew. D'autres ont été nommés par M. Asa Gray, le Dr. Engelmann et autres botanistes de renom.

"L'herbier de l'université contient plus de 10,000 plantes. Il s'est enrichi dernièrement d'un bon nombre d'échantillons donnés par M. N. St. Cyr, curateur du musée de l'Instruction Publique, et par M. le Dr. Macoun, F. R. S. C., de la Commission Géologique Canadienne. Ces dernières espèces viennent toutes du Nord-Ouest Canadien et présentent par conséquent un intérêt tout particulier.

"Pour avoir une idée plus complète des richesses de ce musée, il faudrait y ajouter une collection des bois de la Nouvelle-Zélande, une autre des bois de commerce du Nord-Ouest et de la Colombie-Anglaise, enfin toute une série de types intéressants, destinée à illustrer un grand nombre de cas de développements anormaux de nos tiges ligneuses, de greffes naturelles, de maladies ou de parasitisme végétal."

¹ Can. Rec. Sec. III., 496.

² Ann. de L'Univ. Laval, 1866-67, 95.

UNIVERSITY OF NEW BRUNSWICK.

At the University of New Brunswick, Fredericton, Prof. Bailey reports that there are about one thousand herbarium specimens, in addition to which there are collections of native woods, seeds and fruits. These collections represent material brought together first by Dr. James Robb, but subsequently greatly added to by Dr. Bailey's own efforts, as well as by purchase and donation.

QUEEN'S UNIVERSITY.

Prof. W. J. Fowler informs me that the herbarium under his care includes about 13,500 species, represented by about 25,000 specimens.¹

KING'S COLLEGE.

The botanical collections of the University of King's College, Windsor, Nova Scotia, are represented by a herbarium containing about 2,000 specimens. There is no special arrangement, but the plants are distributed among several small collections of indigenous and foreign species, the largest individual collection being the Cogswell Herbarium of plants from Great Britain, embracing about 1,000 specimens.

In this presentation no attempt has been made to obtain statistics of private herbaria, of which there are many, some of very considerable importance, and it would be a very decided service to Canadian botany if a reliable list, showing their size, location and special features, were to be prepared. A summary of the herbaria of the various institutions of learning as far as heard from, is as follows:

University of New Brunswick.....	1,000
King's College, Nova Scotia.....	2,000
Laval University, Quebec.....	10,000
Queen's University, Kingston.....	10,000
McGill University, Montreal.....	80,000
Geological Survey, Ottawa.....	70,000

Summary.

As we now look back over the three hundred and thirty-seven years that have passed since Thevet published his account of "The New Founde World," we are naturally led to ask what great movements are to be noted in the development of botanical science here, movements which are purely local in character and origin? Until the close of the eighteenth century but few events stand forth with special prominence. The visit of Diéreville to Nova Scotia in 1706 resulted in the conveyance

¹ Of these, the majority are the private property of Prof. Fowler, so that the University collection is reduced to about 10,000.

to France of very important collections upon which Tournefort based his descriptions of many Canadian species. To the missionaries—Hennepin, who preserved the records of the ill-fated expedition of La Salle, Charlevoix, whose statements of fact are to be taken only after careful scrutiny, and Lafitau, who is chiefly notable for his having brought ginseng into great commercial prominence—we are certainly indebted for some of the most extended accounts of the vegetation of Canada during that early period. But the work which commands special consideration on account of its being the first distinctively devoted to the botany of this country, is the "History of Canadian Plants," published by Cornuti in 1635.

A century later the physicians Sarrasin and Gauthier, attached to the Court at Quebec, performed important services to botanical science, and their names have been perpetuated in the genera *Sarracenia* and *Gaultheria*.

The explorations of Kalm and Michaux, as also of Menzies, greatly enriched our knowledge, but such expeditions as that of Mackenzie in 1789, from which much should have been obtained, were barren of results.

It would thus appear that with the exception of Sarrasin and Gauthier, who were actually in residence and who died here, and also the missionaries Hennepin, Charlevoix and Lafitau, there was no advancement in botanical knowledge from internal sources. And while their work was valuable, it was not extended, and cannot be said to have made any very profound impression upon the development of the science.

The results attained by Kalm and Michaux, as also by Diéreville and Menzies, all had their origin in, and were phases of the development of botanical science in Europe. The same is also true of Cornuti's work. Nevertheless, since the latter, together with Michaux's *Flora Boreali*, are the two works which stand out with greatest prominence, as making a distinct impression upon the development of Canadian botany prior to 1800, they may freely be regarded as the land marks of the science in the earlier colonial period, the one for the middle of the seventeenth, the other forming a fitting close to the eighteenth century.

The great land marks of the present century are to be found first in that very noteworthy production by Sir William Hooker, "*The Flora Boreali Americana*." Although for excellent reasons this work fell far short of the original design, it stands to-day as the best and only work of its kind on the plants which belong distinctively to this part of North America. Being based, as the descriptions are, upon material collected by the various Arctic expeditions, by British naturalists on special missions, and by officers of the Hudson's Bay Company, it stands as an epitome of all those labours which have accomplished so much in the advancement of Canadian botany, but which were, nevertheless, side issues in the development of European botany.

The introduction of paleobotany by Sir William Dawson opened up entirely new fields of research, and has led to results of the highest value respecting our knowledge of the vegetation which flourished in earlier periods of the earth's history. Within recent years, the work accomplished by the Geological Survey as embodied in Prof. Macoun's catalogue, has added immensely to our knowledge of distribution, and it has also brought to light many new species. The significance of this work cannot be properly estimated at this time, for although its value in relation to future systematic studies is well understood, it is impossible to measure the bearing which it must have in time to come, upon the geological relations of plants. Both of these events, therefore, significant as they are, and peculiarly indigenous in their origin and growth, must be regarded as the two great land marks of this century.

As we survey the present position of botanical science in Canada, we cannot feel that either actually or relatively it offers very much for congratulation, a view which is not only justified by the facts as they exist, but one which is also enforced by the conviction that an undue satisfaction with existing conditions, is ample guarantee that the future holds no betterment in view. Our universities are yet doing in large measure what more properly belongs to the high schools, and with one or two exceptions, no attempt is made to carry on the higher work of the science. Of research work comparatively little has been done, that which has been so far accomplished being confined to one or two universities and conducted for the most part under great difficulties. This condition is the necessary result of the fact that in only two of our higher institutions have laboratories for the prosecution of advanced work been established, and our students who wish to engage in the higher problems of the science are, in most cases, compelled to go elsewhere where there are more ample facilities. Botanic gardens have been projected, but in most cases have failed to survive a very brief existence. The garden established at Ottawa under Government patronage and control, seems destined to have a permanent and useful career. The garden of McGill University—established after many years of hard labour, and maintained in the face of great obstacles, is accomplishing an important educational work.

Of botanical societies we have only one, the two attempts made in former years having been abandoned in each case at the end of one year.

Economic questions of broad application and great material importance have as yet taken but little hold either upon the scientific or the political section of the community. In Europe great care is bestowed upon the forests; special schools are maintained for the purpose of securing a scientific training to those who are to have the oversight of this great source of national wealth, and a large and efficient corps of foresters is maintained for this purpose. In the United States the same

question is now seriously engaging the attention of Government, and large sums of money are expended in the prosecution of scientific research bearing upon the preservation of forest lands and the economic application of timber.

Enormous sums of money are annually involved in the destruction of crops by the operation of disease and parasitic growths, and in the investigation of their causes and prevention, the United States Government wisely expends much effort and money. At the present time pathology forms a leading feature in the work of the various experiment stations throughout the United States. Although the Experimental Farm at Ottawa is doing important work in this direction, questions of this kind have, as yet, taken no serious hold with us.

It is therefore clear that so long as we are content with present conditions, we must be satisfied to occupy a secondary position, and continue to be dependent upon others for much that should be reckoned among our common resources.

While, therefore, the immediate future of Canadian botanical science does not seem to offer the brilliant prospect which we all desire, we may hope for much better things than the past has revealed. It is to our universities that we turn in the hope that they may, at an early date, appreciate the need of supplying laboratories for research with all the necessary resources to be found in ample herbaria, gardens and libraries, and thus retain within our own borders those students who are now compelled to seek the advantages they desire in foreign institutions.

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- B., Scotland; d., Havana, Cuba, March, 1835.
Assistant Naturalist to the Second Land Arctic Expedition under Franklin.
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FRANKLIN, SIR JOHN.

B., April 16th, 1796; d., June 11th, 1847.

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App. VII., 729.

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GAIRDNER, MEREDITH.

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GANONG, WILLIAM FRANCIS.

B., St. John, N.B., Feb. 10th, 1864.

Prof. Botany and Director of the Botanic Gardens, Smith College, Northampton, Mass.

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GIBB, SIR GEORGE D., BART.

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GOLDIE, JOHN.

B., Maybole, Scotland, March 21st, 1803; d., Ayr., Ontario, Canada, June, 1886.

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GOODE, JOHN B.

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GRAY, ASA.

B., Paris, N. Y., Nov. 18th, 1810; d., Cambridge, Mass., Jan. 30th, 1888.

The very numerous writings of Dr. Gray contain many facts bearing upon Canadian botany, but it is difficult to decide what titles should properly find a place in this list. Those which chiefly touch Canadian botany, and which rightfully have a place here are:

211. Manual of the Botany of the Northern United States.

212. Genera Floræ Americæ.

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213. Flora of North America.

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214. Synoptical Flora of North America, 1884.

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(b) Mosses and Lichens determined by Rev. E. Lehnert;
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GUIGNARD, JONATHAN AUGUSTE.

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14th Ann. Rept. Ent. Soc. Ont., 1886, 39-40.

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B., Windsor, N.S., Dec., 1706; d., Islesworth, England, Aug. 27th,
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HARRINGTON, BERNARD J.

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HARVEY, WILLIAM HENRY.

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May 15th, 1866.222. Nereis Boreall Americana; or Contributions to the History of the Marine
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Smithson. Contrib., 1852, III.; 1853, V.; 1858, X.

223. Notice of a Collection of Algae made on the North Coast of North America,
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Bot. Lit., 1872, 130; Biog. Ind., Brit. and Irish Bot., 1893.

HAY, GEORGE UPHAM.

B., Norton, Kings County, N.B., June 18th, 1844.

English Master, St. John Grammar School.

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HOLMES, A. F.

D., Montreal, Oct. 9th, 1860.
A zealous collector, 1820-1825, and Prof. of Botany in the Medical Faculty of McGill University, 1829-1845. Collections in the Herbarium of McGill University.

HOOKER, SIR JOSEPH DALTON.

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B., Norwich, England, July 6th, 1795; d., Kew, England, Aug. 12th, 1865.

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JAMES, THOMAS POTT.

B., Radnor, Pa., Sept. 1st, 1808; d., Cambridge, Mass., Feb. 22nd, 1882.

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JEFFREY, EDWARD C.

B., St. Catharines, Ont., May 21st, 1866.

Lecturer in Biology, University of Toronto.

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KANE, ELISHA KENT.

B., Philadelphia, Pa., Feb. 3rd, 1820; d., Havana, Cuba, Feb. 16th, 1857.

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B., Greenock, Scotland, 1822; d., Canada, May 4th, 1884.

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KINDBERG, NILS CONRAD.

B., Carlstad, Sweden, Aug. 7th, 1832.

Prof. in State College (Lector), Linköping, Sweden.

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B., Scotland, 1827; d., Halifax, N.S., Nov. 10th, 1895.

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B., Edinburgh, Scotland, Dec. 19th, 1829; d., Edinburgh, Nov. 24th, 1880.

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LOGIE, ALEXANDER.

B., Nairn, Scotland, 16th December, 1823; d., Hamilton, Ontario, 10th Dec., 1873.

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LYALL, DAVID.

B., Auchinblae, Kincardineshire, Scotland, June 1st, 1817; d., Cheltenham, England, March 2nd, 1895.

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Jn'l Linn. Soc., 1863, VII., 124.

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MATTHEW, GEORGE F.

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MACKAY, ALEXANDER HOWARD.

B., Mt. Dalhousie, Pictou, Nova Scotia, May 19th, 1848.
Supt. of Education for Nova Scotia, Halifax, N.S.

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MACCOUN, JOHN.

B., Maralin, Ireland, April 17th, 1832.

Botanist to the Geological Survey of Canada.

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MILLMAN, THOMAS.

B., Woodstock, Ontario, Feb. 14th, 1850.

Asst. Med. Supt. Asylum for Insane, Kingston, Ont.

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MOYEN, L'ABBÉ J.

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B., St. John, N.B., 1828; d., Roanoke, Va., U.S.A., July 9th, 1890.

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OSLER, WILLIAM.

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B., Cupar, Fifeshire, Scotland, May 7th, 1847.
Prof. Botany and Geology Ontario Agricultural College, Guelph,
Ont.

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B., Bath, England, Dec. 19th, 1790; d., Ems, Germany, July 8th,
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B., Kittery Point, Maine, U.S.A., May 25th, 1854.

Prof. Botany, McGill University, Montreal, Canada, and Director
of the Botanic Garden.

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B., Grossenhayn, Saxony, Feb. 4th, 1774; d., Montreal, Canada,
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B., Bloomington, Ill., Nov. 8th, 1864.
Curator of the Gray Herbarium, Harvard University.
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B., Inch, Scotland, June 24th, 1777; d., London, England, Aug. 30th, 1856.

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Bib.: Cent. Cyc. Names, 868.

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SARGENT, CHARLES SPRAGUE.

B., Boston, Mass., U.S.A., April 24th, 1841.

Director of the Arnold Arboretum of Harvard University, Brookline, Mass.

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SCHREINER, H. VON.

B., College Point, Long Island, N.Y., March 12th, 1873.
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SCHWEINITZ, LUDWIG DAVID VON.

B., Bethlehem, Pa., U.S.A., Feb. 13th, 1780; d., Bethlehem, Pa., Feb. 8th, 1834.

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B., Amherstburg, Ont., Jan. 1st, 1840; d., Monterey, Mexico, April 13th, 1893.

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SCOULER, JOHN.

B., Glasgow, Scotland, Jan. 31st, 1804; d., Glasgow, Scotland, Nov. 13th, 1871.

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Bib.: R. Soc. Cat., V., 607; Hook. Bot. Miss., I., 94, 98; Blog. Ind., Brit. and Irish Bot., 181.

SEEMAN, BERTHOLD CARL.

B., Hanover, Germany, Feb. 28th, 1825; d., Javoll Mine, Nicaragua, Oct. 10th, 1871.

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SMALL, H. BEAUMONT.

B., Market Bosworth, Leicestershire, England, October 31, 1831

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442. Waterhouse's Lectures.

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443. Pine Life.

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SMITH, TITUS.

B., Granby, Mass., U.S.A., Sept. 4th, 1768; d., Dutch Village, Halifax, N.S., Jan. 4th, 1850.

Mr. Smith's writings are scattered through the local press, and always unsigned, so that it is extremely difficult to trace them at the present time. Mr. H. Piers, of Halifax, has, nevertheless, succeeded in tracing a few. These are given below.

445. A List of the principal indigenous Plants of Nova Scotia.

M. Mag., Halifax, N.S., (Feb., 1831) I., 342.

446. On the operation of Fungi in disintegrating Vegetable Substances.

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447. The Vegetation of Nova Scotia.

Mag. Nat. Hist., 1835.

Bib.: Murdoch, Hist. Nova Scotia.

SOMERS, JOHN.

B., St. John's, Newfoundland, March 29th, 1844.

Prof. Materia Medica, Halifax Medical College.

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450. Notes on Nova Scotia Compositae—Asters.

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452. New and Rare Plants.

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SULLIVANT, WILLIAM S.

B., Columbus, Ohio, Jan. 15th, 1863; d., Columbus, April 30th, 1873. *Sullivantia* of Torrey and Gray.

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D., Victoria, B.C., 1886.

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No writings, collections only.

Bib.: Amer. Jnl. Sc., CXXXIII., 244; Biog. Ind., Brit. and Irish Bot., 170; Flor. Bor. Amer., I., pref. iii.

TORREY, JOHN.

B., New York, N.Y., Aug. 15th, 1796; d., New York, March 10th, 1873.

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B., Boston, Mass., Dec. 7th, 1817; d., Amherst, Mass., March 15th, 1886.

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WATT, DAVID A. POE.

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